

WHAT IS CLAIMED IS:

1. A radio wave radar system for obtaining at least one of a distance and a relative speed between a host vehicle and a forward object, comprising:

modulation means for modulating a transmitting radio wave frequency;

means for identifying a phase information and a frequency information of a received reflection wave corresponding to the transmission frequency; and

control means for switching modulation methods in the modulation means depending on variation of the relative speed between the host vehicle and the forward object.

2. A radio wave radar system according to claim 1, further comprising at least two frequency modulation means and signal processing means, the at least two frequency modulation means and signal processing means including frequency modulation means and signal processing means, which are suitable for a case where the relative speed between the host vehicle and the forward object is higher than a predetermined threshold value, and frequency modulation means and signal processing means, which are suitable for a case where the relative speed between the host vehicle and the forward object is lower than a predetermined threshold value,

wherein the control means selects the distance and the relative speed between the host vehicle and the forward object based on the signal processing results obtained from the frequency modulation means and the signal processing means.

3. A radio wave radar system according to claim 2, wherein the control means selects the signal processing result obtained from the frequency modulation means and the signal processing means, which are suitable for a case where the relative speed between the host vehicle and the forward object is higher than the predetermined threshold value, when the relative speed between the host vehicle and the forward object is higher than a predetermined threshold value, and selects the signal processing result obtained from the frequency modulation means and the signal processing means, which are suitable for a case where the relative speed between the host vehicle and the forward object is higher than the predetermined threshold value, or uses the two kinds of frequency modulation means and signal processing means in combination, when the relative speed between the host vehicle and the forward object is lower than a predetermined threshold value.

4. A radio wave radar system according to claim 3, wherein the control means switches a two-frequency continuous wave (CW) modulation method and a frequency pulse continuous wave (CW) modulation method, the two-frequency CW modulation method alternately modulating two frequencies and being suitable for a case where the relative speed between the host vehicle and the forward object is higher than a predetermined threshold value, and the frequency pulse CW modulation method modulating a constant frequency into at least two types of separate frequencies only for a short time interval and being suitable

for a case where the relative speed between the host vehicle and the forward object is lower than a predetermined threshold value.

5. A radio wave radar system according to claim 4, wherein a pulse generation time interval in the frequency pulse CW modulation method is determined on the basis of a phase information of an intermediate frequency signal obtained when the two-frequency CW modulation method is used.

6. A radio wave radar system according to claim 4, wherein the distance between the host vehicle and the forward object is calculated from a phase information of an intermediated frequency signal obtained when the two-frequency CW modulation method is used, and the frequency pulse have the same pulse generation time interval as a reciprocating time for the radio wave signal radiated from the radar to be reflected from the forward object and return.

7. A radio wave radar system according to claim 4, further comprising frequency pulse continuous wave modulation means for performing a modulation such that differences between respective frequencies of frequency pulses are equal.

8. A radio wave radar system according to claim 4, further comprising:

frequency filter means for passing any frequency signal of the intermediate frequency signals obtained by the frequency pulse CW modulation means;

signal converting means for converting amplitudes of the intermediate frequency signals into DC voltage signals; and

signal processing means for detecting existence or nonexistence of the DC voltage signals.

9. A radio wave radar system for calculating a distance or a relative speed between a host vehicle and a forward object, comprising:

modulation means for modulating a transmitting radio wave frequency;

means for identifying a phase information and a frequency information of a received reflection wave corresponding to the transmission frequency;

control means for switching modulation methods in the modulation means depending on variation of the relative speed between the host vehicle and the forward object; and

measuring means for measuring a time difference between a time when the transmission frequency is modulated from an arbitrary frequency to a separate frequency only for a short time and a time when the modulated frequency is received.

10. A radio wave radar system according to claim 9, wherein the control means selects a modulation signal of a two-frequency CW modulation method when an absolute value of the relative speed between the host vehicle and the forward object is equal to or greater than a predetermined value, switches the modulation method into a frequency pulse CW modulation method or uses the two modulation methods in combination when the absolute value

of the relative speed is less than a predetermined value.

11. A radio wave radar system for calculating a distance or a relative speed between a host vehicle and a forward object, comprising:

modulation means for modulating a transmitting radio wave frequency;

means for identifying a phase information and a frequency information of a received reflection wave corresponding to the transmission frequency; and

control means for switching a modulation method into a frequency pulse CW modulation method, the frequency pulse CW modulation method modulating an constant frequency into at least two types of separate frequencies only for a short time.

12. A radio wave radar system according to claim 3, wherein the frequency modulation means suitable for a case where the relative speed between the host vehicle and the forward object is higher than the predetermined threshold value uses the two-frequency CW modulation method of alternately modulating two frequencies.

13. A radio wave radar system according to claim 3, wherein the frequency modulation means suitable for a case where the relative speed between the host vehicle and the forward object is lower than the predetermined threshold value uses a FM-CW modulation method of linearly modulating a frequency.

14. An adaptive cruise control system for controlling brake actuator driving means and accelerator throttle driving means to constantly keep maintaining a distance from a host vehicle equipped with the radio wave radar system on the basis of a distance information from the radio wave radar system according to any one of claims 1 to 13.